

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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SHENZHEN APALTEK CO., LTD.,  
Petitioner,

v.

ASETEK DANMARK A/S,  
Patent Owner.

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IPR2022-01318  
Patent 10,078,355 B2

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Before MICHAEL P. TIERNEY, *Vice Chief Administrative Patent Judge*,  
KEVIN W. CHERRY, and JASON W. MELVIN,  
*Administrative Patent Judges*.

MELVIN, *Administrative Patent Judge*.

JUDGMENT  
Final Written Decision  
Determining All Challenged Claims Unpatentable  
*35 U.S.C. § 318(a)*

## I. INTRODUCTION

ShenZhen Apaltek Co., Ltd. (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting institution of *inter partes* review of claims 1–10, 12, and 14–16 of U.S. Patent No. 10,078,355 B2 (Ex. 1001, “the ’355 patent”). Asetek Danmark A/S (“Patent Owner”) filed a Preliminary Response. Paper 5 (“Prelim. Resp.”). In the Preliminary Response, Patent Owner notes that it has disclaimed claims 3, 4, 7, and 9–16. Prelim. Resp. 2 (citing Ex. 2002). Thus, this proceeding involves only claims 1, 2, 5, 6, and 8 (“the challenged claims”). As authorized, Petitioner filed a Preliminary Reply. Paper 6. Pursuant to 35 U.S.C. § 314 and 37 C.F.R. § 42.4(a), we instituted review. Paper 7. No party filed a paper after institution.

We have jurisdiction under 35 U.S.C. § 6. This is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of claims 1, 2, 5, 6, and 8 of the ’355 patent. We hold that Petitioner has demonstrated by a preponderance of the evidence that the challenged claims are unpatentable.

### A. REAL PARTIES IN INTEREST

Petitioner identifies itself as the real party-in-interest. Pet. 77. Patent Owner identifies Asetek Danmark A/S, Asetek USA, Inc., Asetek A/S, and Asetek Holdings, Inc. as the real parties-in-interest for Patent Owner. Paper 4, 1 (Patent Owner’s Mandatory Notices).

### B. RELATED MATTERS

The parties identify the following related litigations: *Asetek Danmark A/S v. CoolIT Systems, Inc.*, No. 3:19-cv-00410 (N.D. Cal.); *Cooler Master Co., Ltd. v. Asetek Danmark A/S*, No. 4:21-cv-04627 (N.D. Cal.); *Asetek Danmark A/S v. Shenzhen Apaltek Co., Ltd.*, No. 6:21-cv-00501 (W.D. Tex.)

(transferred to N.D. Cal., May 6, 2022); and *Asetek Danmark A/S v. CoolIT Systems, Inc.*, No. 22-1049 (Fed. Cir.). Pet. 77; Paper 4, 1.

The parties also identify the following Office proceedings: IPR2020-00522, IPR2020-00523, and IPR2020-00524, which were filed in February 2020 and concluded in August 2021, IPR2021-01195 against U.S. Patent No. 10,613,601 and IPR2021-01196 against U.S. Patent No. 10,599,196, and U.S. Patent Application No. 17/671,197. Pet. 77–78; Paper 4, 1–2.

### C. THE '355 PATENT

The '355 patent is titled “Cooling System for a Computer System.” Ex. 1001, code (54). It issued from an application filed June 19, 2017, as a continuation of application No. 13/861,593, which issued as Patent No. 9,733,681 B2 and claims priority to a PCT application filed May 6, 2005. *Id.* at code (63).

The '355 patent relates to a liquid-cooling system for a computer system. *Id.* at code (57). The specification explains, at the time of the invention, air cooling arrangements were the most-used cooling system for cooling central processing units (CPUs) in computer systems. *Id.* at 1:17–33. An alternative design known at the time of the invention was to use a cooling liquid circulating inside a closed system by means of a pumping unit with a heat exchanger past which the cooling liquid circulates. *Id.* at 1:34–38. The specification contends that liquid cooling is generally more efficient and quieter than air cooling, but that a liquid cooling design consists of “many components,” which increases the total installation time, size, and risk of leakage of the cooling liquid from the system. *Id.* at 1:39–49. Thus, one object of the invention is to provide a small and compact liquid-cooling

solution that is more efficient than existing air-cooling arrangements and can be produced at low cost enabling high production volumes, be easy-to-use and implement, can be used with existing CPU types and computer systems, and requires a low level of maintenance or no maintenance at all. *Id.* at 1:53–63.

An illustrative embodiment of such a device is depicted in Figures 7 and 8, reproduced below.

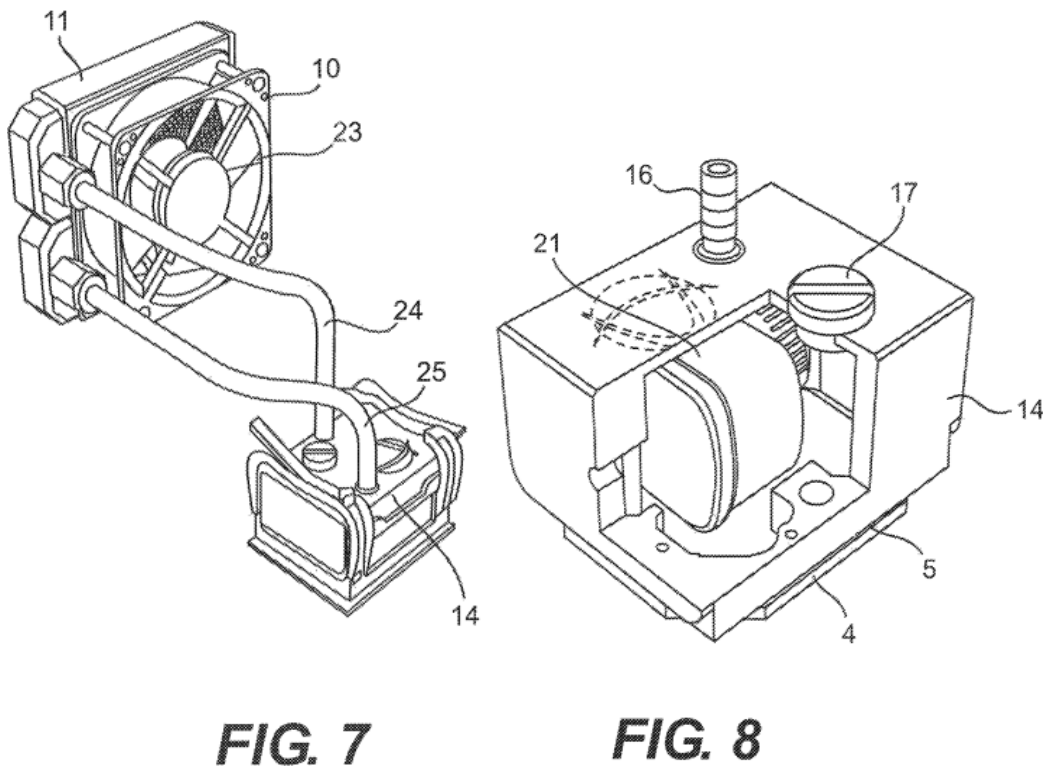


Figure 7<sup>1</sup> is a perspective view of the cooling system showing reservoir housing 14 with the heat exchanging surface 5 (shown in Figure 8) and the

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<sup>1</sup> We agree with Petitioner that it appears that the specification transposes the description of Figure 7 with that of Figure 8. Pet. 6 n.1. We refer to the description of “Figure 8” in the specification in our discussion of Figure 7, and we refer to the specification’s discussion of “Figure 7” in our discussion of Figure 8.

pump 21 (shown in Figure 8) inside the reservoir. *Id.* at 16:16–19. Figure 8 is a cut-out view into reservoir housing 14, when the reservoir, pump 21, and heat exchanging surface 4 are situated inside the reservoir. *Id.* at 15:49–51. The reservoir has a tube inlet connection (not shown in Figure 8) through which the cooling liquid enters the reservoir. *Id.* at 15:51–53. From the tube inlet connection, the cooling liquid flows through the reservoir passing heat exchanging surface 4 and enters the inlet of the pump. *Id.* at 15:54–56. After the cooling liquid flows through the pump, the cooling liquid passes out of the outlet of the pump and further out through tube outlet connection 16. *Id.* at 15:56–58. As shown in Figure 7, tube inlet connection and tube outlet connection 16 are connected to heat radiator 11 by means of connecting tubes 24 and 25. *Id.* at 16:19–21. Cooling liquid flows into and out of the reservoir and the heat radiator through connecting tubes 24 and 25, respectively. *Id.* at 16:21–23. Heat radiator 11 (shown in Figure 7) cools the cooling liquid before it passes back into the reservoir. *Id.* at 16:26–30.

The reservoir may be provided with channels or segments for establishing a certain flow-path for the cooling liquid through the reservoir to prevent the cooling liquid passing the reservoir too quickly to take up a sufficient amount of heat from the heat exchanging surface. *Id.* at 16:51–62.

Figures 17 and 20 show the internal structures of a preferred embodiment of the reservoir according to the invention and are reproduced below. *Id.* at 21:48–50.

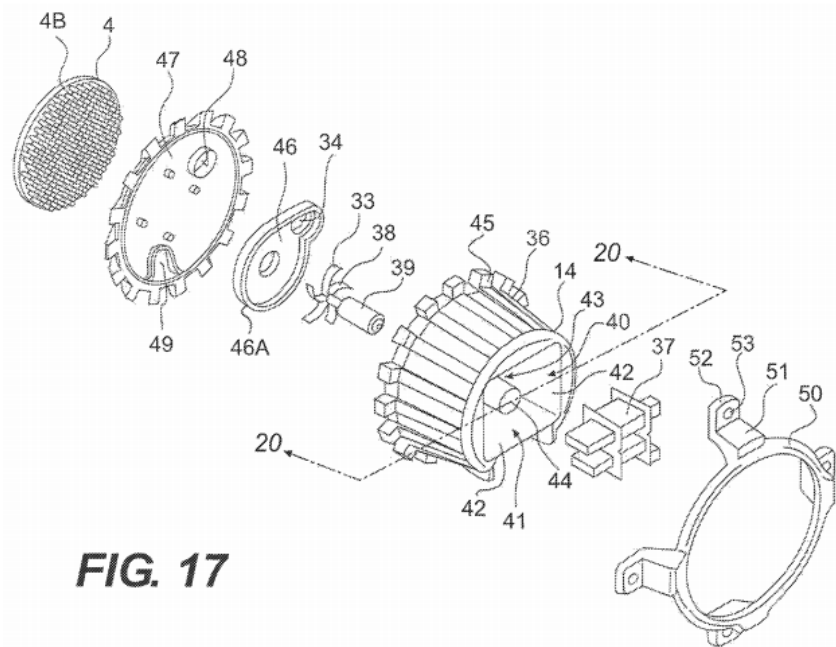


**FIG. 17**

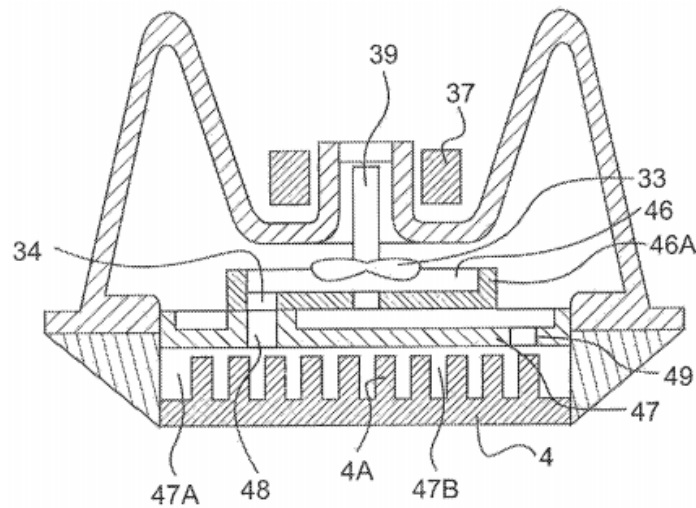


**FIG. 20**

Figure 17 is an exploded perspective view of a preferred embodiment of a reservoir and a pump and the heat exchanging surface. *Id.* at 10:7–9. Figure 20 is a simplified schematic showing a cross-sectional view of the reservoir along plane 20-20 of Figure 17. *Id.* at 10:16–17. Reservoir housing 14 as shown in Figures 17 and 20 is in the form of a double-sided chassis having a

substantially conical, circular configuration with stiffening ribs 36 extending axially along the exterior of the reservoir housing and configured to mount an electrical motor. *Id.* at 21:49–57. Reservoir housing 14 has recess 40 intended for accommodating stator 37 of an electrical motor driving impeller 33 of the pump, which is attached to shaft 38 of rotor 39 of the electric motor. *Id.* at 21:58–22:1. The specification explains that “a liquid-proof division” is made between rotor 39 of the motor, which is submerged in the cooling liquid, and the stator 37 of the pump. *Id.* at 22:10–22:14.

The enclosed space between impeller 33 and heating exchanging interface 4 is divided into two separate chambers by impeller cover 46A and intermediate member 47, as shown in Figure 20. The chamber formed by impeller 33 and impeller cover 46A is described as “pump chamber 46” and has outlet 34. *Id.* at 22:64–67.

#### D. CHALLENGED CLAIMS

Challenged claim 1 is independent and is reproduced below:

1. A liquid cooling system for cooling a heat-generating component of a computer, comprising:
  - a reservoir configured to circulate a cooling liquid therethrough, the reservoir including:
  - a pump chamber housing an impeller and defined at least in part by an impeller cover and a double-sided chassis, the impeller being positioned on one side of the chassis and a stator of the pump is positioned on an opposite side of the chassis;
  - a thermal exchange chamber disposed between the pump chamber and the heat-generating component when the system is installed on the heat-generating component;
  - a heat-exchanging interface forming a boundary wall of the thermal exchange chamber, the heat-exchanging

interface has an outer surface configured to be placed in thermal contact with a surface of the heat-generating component and an inner surface that defines a plurality of channels that direct the flow of a cooling liquid within the thermal exchange chamber;

a heat radiator adapted to pass the cooling liquid therethrough, the heat radiator being fluidly coupled to the reservoir via fluid conduits, the heat radiator being configured to dissipate heat from the cooling liquid;

wherein the pump chamber further includes:

an inlet defined by the impeller cover positioned below a center of the impeller configured to enable the cooling liquid to flow into the center of the pump chamber;

an outlet defined by the impeller cover positioned tangentially to the circumference of the impeller.

*Id.* at 28:19–47. The other challenged claims depend directly from claim 1.

#### E. PRIOR ART AND ASSERTED GROUNDS

Petitioner asserts the following grounds of unpatentability:

| <b>Claim(s) Challenged</b> | <b>35 U.S.C. §</b> | <b>Reference(s)/Basis</b> |
|----------------------------|--------------------|---------------------------|
| 1, 2, 6                    | 103                | Duan <sup>2</sup>         |
| 5, 8                       | 103                | Duan, Wu <sup>3</sup>     |

Pet. 5. Petitioner also relies on the Declaration of George Karamanis, Ph.D. Ex. 1003.

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<sup>2</sup> U.S. Pat. Appl. Pub. No. 2006/0185830 A1, pub. Aug. 24, 2006 (Ex. 1004).

<sup>3</sup> U.S. Pat. No. 6,894,899 B2, iss. May 17, 2005 (Ex. 1006).

## II. ANALYSIS

### A. LEVEL OF ORDINARY SKILL IN THE ART

Petitioner proposes that a person of ordinary skill

would have been knowledgeable regarding liquid cooling systems for computer systems, would have had a Bachelor of Science (B.S.) in electrical or mechanical engineering, or similar advanced post-graduate education in this area, or would have possessed at least 2–3 years of experience in liquid cooling systems for computer systems or similar systems. A POSITA would be knowledgeable of the concepts, components, and their functions described as “prior art” in the ’355 patent such as, e.g., pumps, radiators, fans, reservoirs, and other techniques of heat dissipation and liquid cooling. (Ex-1001,1:11–47.) In addition, a POSITA would be knowledgeable about electric motors and their components (e.g., electromagnetic coils, rotors, stators, AC/DC motors, etc.)

Pet. 6–7 (citing Ex. 1003 ¶¶ 13–18). Patent Owner has not proposed a level of ordinary skill in the art. We adopt Petitioner’s proposed level of ordinary skill as it appears to be consistent with the level of skill reflected by the specification and in the asserted prior art references.

### B. CLAIM CONSTRUCTION

For an *inter partes* review petition filed after November 13, 2018, we construe claim terms “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b) (2019).

Based on our analysis of the proceeding, we conclude that no claim term requires express construction. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

### C. OBVIOUSNESS OVER DUAN

Duan’s system includes a cooling plate module with a cooling plate integrally formed with a liquid driving module such that the layout of the cooling plate module can be minimized to reduce space. Ex. 1004 ¶ 7. Figure 6, reproduced below, is a view of Duan’s “liquid cooling cyclic mechanism.” *Id.* ¶ 17.

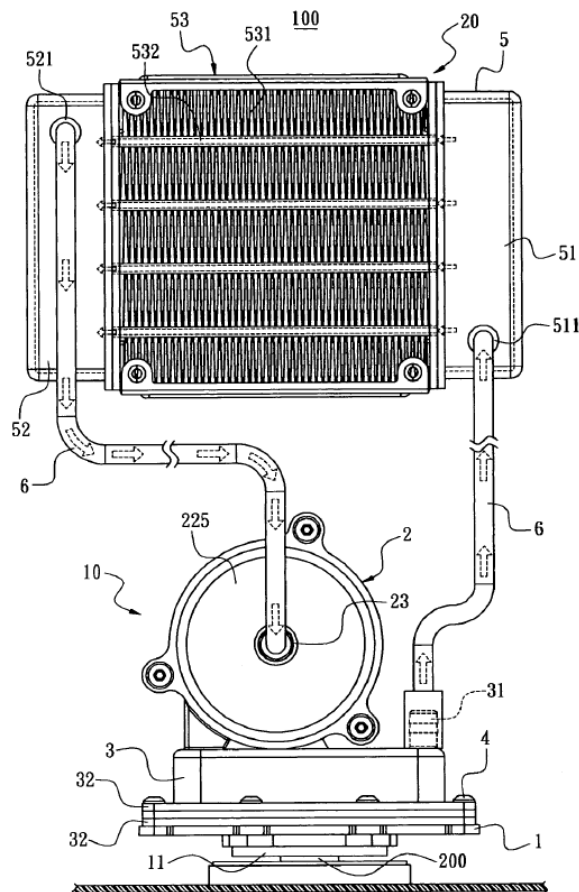


FIG. 6

Duan's Figure 6 shows liquid cooling cyclic mechanism 100 for cooling CPU 200. *Id.* ¶ 22. Liquid cooling cyclic mechanism 100 comprises cooling module 10 and water tank module 20, which is connected with cooling plate module 10 through ducts. *Id.* Cooling plate module 10 includes cooling plate

1, liquid driving module 2, and heat absorbing interface 11. *Id.* Heat absorbing face 11 is in contact with CPU 200 for dissipating heat generated by the CPU. *Id.* ¶ 26. Water tank 20 includes cooling stage 53. *Id.* ¶ 25. Driven by liquid driving module 2 (a pump), liquid heated by CPU 200 flows to cooling stage 53, where heat dissipates through heat-dissipating fins 531, and the resulting cool liquid flows back to cooling plate module 10. *Id.* ¶¶ 23–26.

1. Claim 1

Petitioner maps the language of independent claim 1 to Duan’s disclosures. Pet. 17–45. Petitioner maps the claimed reservoir to Duan’s “structure formed by an accommodation chamber 21, lower cover 225, cap 3, and cooling plate 1.” *Id.* at 18. Petitioner maps the claimed double-sided chassis to Duan’s accommodation chamber 21 and the claimed impeller cover to Duan’s lower cover 225. *Id.* at 22–27. Petitioner maps the claimed thermal-exchange chamber to Duan’s cap 3 and cooling plate 1, with heat-absorbing face 11 and cooling plate 1 corresponding to the claimed heat exchanging interface. *Id.* at 27–36. Petitioner maps the claimed radiator to Duan’s cooling stage 53. *Id.* at 36–39. Petitioner asserts that Duan’s inlet is “below a center of the impeller” because it is along the axis about which the impeller rotates. *Id.* at 39–41. Petitioner asserts that Duan’s lower cover 225 defines an outlet tangential to the impeller’s circumference. *Id.* at 41–45. In summary, Petitioner asserts that Duan, without modification, discloses all of claim 1’s limitations.

Patent Owner does not challenge Petitioner’s contentions, as it has filed no Patent Owner Response. We have reviewed Petitioner’s contentions and conclude that they show by a preponderance of the evidence that

claim 1's subject matter would have been obvious over Duan. *See* Pet. 17–45. We adopt Petition's unchallenged contentions as our analysis.

2. *Additional claims*

Petitioner provides contentions showing how Duan teaches the additional limitations of claims 2 and 6. Pet. 46–49, 52–54. Patent Owner does not challenge Petitioner's contentions, as it has filed no Patent Owner Response. We have reviewed Petitioner's contentions and conclude that they show by a preponderance of the evidence that the subject matter of claims 2 and 6 would have been obvious over Duan. We adopt Petition's unchallenged contentions as our analysis.

D. OBVIOUSNESS OVER DUAN AND WU

Petitioner presents assertions regarding obviousness of claims 5 and 8 over Duan and Wu, accounting for the additional terms in those dependent claims. Pet. 71–73.

As to claim 5, Petitioner asserts that it would have been obvious to use Wu's approach to securing chassis and heat-exchanging interface to the heat generating component, because Duan discusses the need to assemble its components but does not provide detailed instruction. *Id.* Thus, the modification would provide the benefit of securing Duan's cooling plate module and cooling plate to the CPU. *Id.* at 72.

For claim 8, Petitioner asserts that it would have been obvious to use Wu's approach to blowing air through the radiator using a fan driven by a motor separate from the pump's motor. *Id.* at 72–73. Petitioner reasons that doing so would improve Duan's performance by increasing heat dissipation.

*Id.* at 74. We agree that Petitioner’s contentions support the modification with rational underpinning.

Patent Owner does not challenge Petitioner’s contentions, as it has filed no Patent Owner Response. We have reviewed Petitioner’s contentions and conclude that they show by a preponderance of the evidence that the subject matter of claims 5 and 8 would have been obvious over Duan and Wu. We adopt Petition’s unchallenged contentions as our analysis.

### III. CONCLUSION<sup>4</sup>

We conclude Petitioner has shown the challenged claims are unpatentable. In summary:

| <b>Claim(s)</b>            | <b>35<br/>U.S.C.<br/>§</b> | <b>Reference(s)/Basis</b> | <b>Claims<br/>Shown<br/>Unpatentable</b> | <b>Claims<br/>Not Shown<br/>Unpatentable</b> |
|----------------------------|----------------------------|---------------------------|------------------------------------------|----------------------------------------------|
| 1, 2, 6                    | 103                        | Duan                      | 1, 2, 6                                  |                                              |
| 5, 8                       | 103                        | Duan, Wu                  | 5, 8                                     |                                              |
| <b>Overall<br/>Outcome</b> |                            |                           | 1, 2, 5, 6, 8                            |                                              |

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<sup>4</sup> Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. §§ 42.8(a)(3), (b)(2).

#### IV. ORDER

Accordingly, it is

ORDERED that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 5, 6, and 8 of the '355 patent are unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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